REMARKS

Applicants acknowledge that prosecution of this application has been re-opened and that a new non-final Office Action has been issued, including new grounds of rejection, based on the Bosselaar et al reference (WO 95/25264). In particular, Claims 1 and 7 have been rejected under 35 U.S.C. §102(b) as anticipated by Bosselaar et al, while Claim 8 has been rejected under 35 U.S.C. §103(a) as unpatentable over Bosselaar et al in view of Kiewit (U.S. Patent No. 5,040,409). In addition, Claim 9 has been rejected as unpatentable over the same two references and further in view of Braathen et al (U.S. Patent No. 6,305,233); and Claim 10 has been rejected over the same two references and further in view of Roy (GB 2 335 041). Further, Claims 1-3 and 13 have been rejected as unpatentable over Kiewit in view of Jordan (U.S. Patent No. 5,557,969); Claims 4 and 16 have been rejected over Kiewit in view of Jordan and further in view of Braathen et al; and Claims 5 and 17 have been rejected as unpatentable over Kiewit in view of Jordan and Braathen et al and further in view of Roy. However, for the reasons set forth hereinafter, Applicants respectfully submit that all claims which remain of record in this application distinguish over the cited references, whether considered separately or in combination. (Claims 6, 11, 12 and 14 have previously been cancelled.)

The present invention is directed to a method and apparatus for detecting leakage conditions in fluid conducting pipes. In particular, Applicants' experiments, as summarized in the specification at page 5, line 20 through page

13, line 9 have established that it is possible to detect the occurrence of a leak by analyzing the frequency spectrum of the resulting noise which is propagated in the pipes. Therefore, according to the invention, as described in the specification at page 5, lines 3 through 19, and depicted in Figure 1 of the drawing, a sensor 12 is used to detect vibrations which are occurring in a pipe, and an output signal from the sensor is supplied to a processing unit 4. The latter signal is then segmented to at least two spectral bands, the amplitudes of which are compared with predetermined values to determine a flow rate, as described in the specification, for example, at page 2, lines 19-24. The presence of a leak is detected based on the information determined in this manner.

The newly cited Bosselaar et al reference (U.S. Patent No. 3,462,240) makes measurements at two frequency ranges, but the reason for doing so is that it enables the "noise" to be measured substantially independently to the signal. As used in Bosselaar et al, the term "noise" refers to all vibrations due to fluid flow. The reason for this is that the inventors in Bosselaar et al determined that the vibration level varies with the flow rate inside the pipe, as well as due to the leak itself. As mentioned in Column 1, line 55, it is desired to determine a peak signal by producing a better signal-to-noise ratio. This is done by providing a signal path which includes the desired signal together with the noise and a second signal path which detects frequencies which favor the noise. The noise is thus detected at the same time as the desired signal as mentioned in Column 2,

lines 1 through 35. A difference measuring circuit determines the level of the wanted leak originating signal.

The invention claimed in the present application is simpler than this prior art. It considers the signal in two spectral bands, and from these, it determines flow rates. If the flow rate is quite high, a large leak may have occurred. Accordingly, the independent claims of the independent claims of the application have been amended to clarify this point. In particular, Claims 1 and 13 now recite that the amplitudes of the spectral bands are compared with predetermined values "to determine the spectral bands, and from the determined spectral bands determining a corresponding flow rate, and if the flow of corresponding flow rate exceeds a predetermined value, determining that a leak condition exists". Thus, the claims as amended emphasize that the present invention considers bands rather than processing a band to determine a signal level within that band, and determining therefrom a flow rate.

The importance of this feature of the invention is that a band relatively close to a sensor will have a series of peaks of a large amplitude. Moving the sensor will result in the amplitudes of the peaks being reduced through attenuation. However, the positions of the peak and their relative amplitude levels (that is, the characteristic of the band) will remain substantially the same. Thus, if one relies upon a particular peak in the band to determine by its amplitude the flow rate, it is possible to arrive at a different value by moving the

sensor. However, using the methodology according to the invention, a particular spectral band is detected at a first position and the same spectral band at the second position. Hence, the same flow rate is determined.

None of the cited prior art documents identifies a flow rate by identifying a spectral band. Accordingly, Applicants respectfully submit that the claims as amended distinguish over the cited Bosselaar et al reference, and the other cited references as well.

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and

please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #3036/50371).

Respectfully submitted,

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